CLAIMS

What is claimed is:

1	1. A global positioning system (Of 5) received system, comprising.
2	a GPS clock that is calibrated to GPS time when the GPS receiver system is
3	navigating using GPS satellite data, wherein the GPS clock is configured to be turned off
4	when the GPS receiver system is not navigating;
5	a real time clock (RTC) that uses significantly less power than the GPS clock,
6	wherein the RTC is configured to keep time when the GPS clock is turned off;
7	a brownout detection circuit coupled to the RTC, wherein the brownout detection
8	circuit is configured to,
9	receive an RTC clock signal;
0	detect a loss of RTC clock cycles; and
1	output an RTC status signal that indicates a loss of RTC clock cycles above a
2	predetermined threshold.
1	2. The GPS receiver system of claim 1, wherein the brownout detection circuit
2	comprises:
3	a detection circuit that receives the RTC clock signal and determines whether the
4	RTC clock is losing cycles, wherein the detection circuit is calibrated to determine whether a
5	loss of cycles is above the predetermined threshold; and
6	a status circuit that stores a signal output by the detection circuit and outputs a status
7	signal indicating the RTC clock is one of GOOD and NOT GOOD.

1	3. The GPS receiver system of claim 2, wherein the detection circuit comprises a
2	resistor-capacitor (RC) time constant component with a predetermined time constant,
3	wherein the RC time constant component receives the RTC clock signal and outputs a
4	decayed voltage, wherein a level of the decayed voltage indicates whether the loss of cycles
5	is above the predetermined threshold.
1	4. The GPS receiver of claim 3, further comprising a navigation processor
2	coupled to receive the status signal, wherein the navigation processor determines whether to
3	use the RTC clock for acquisition of satellites based on the status signal.
1	5. The GPS receiver system of claim 4, further comprising an edge aligned ratio
2	counter (EARC) coupled to the RTC and to the GPS clock, wherein, on start-up of the GPS
3	receiver system for satellite acquisition, time kept by the RTC clock is transferred to the GS
4	clock using the EARC, and wherein the transferred RTC time is used for acquisition if the
5	status signal indicates the RTC is GOOD.
1	6. A system for global positioning system (GPS) navigation comprising:
2	a baseband chip; and
3	a radio frequency (RF) chip, wherein the RF chip and the baseband chip are coupled
4	through an interface, and wherein the RF chip comprises:
5	a GPS clock that is calibrated to GPS time when the GPS receiver system is
6	navigating using GPS satellite data, wherein the GPS clock is configured to be turned off

when the GPS receiver system is not navigating;

8	a real time clock (RTC) that uses significantly less power than the GPS clock,
9	wherein the RTC is configured to keep time when the GPS clock is turned off; and
10	a brownout detection circuit coupled to the RTC, wherein the brownout detection
11	circuit is configured to detect a loss of RTC clock cycles.
1	7. The system of claim 6, wherein the RF chip further comprises:
2	a temperature sensor coupled to the RTC; and
3	an analog to digital (A/D) converter coupled to the temperature sensor.
1	8. The system of claim 7, wherein the baseband chip comprises:
2	a navigation processor coupled to receive signals from the RF chip through the
3	interface, including an RTC status signal that indicates whether the RTC clock signal should
4	be used for satellite acquisition;
5	an edge aligned ratio counter (EARC) coupled to receive a GPS clock signal and the
6	RTC clock signal and configured to align respective GPS and RTC clock signals with a high
7	degree of accuracy, and to transfer time kept by the RTC clock to the GPS clock; and
8	a memory device coupled to the A/D converter and to the RTC, and configured to
9	store a table relating temperature to frequency for the RTC clock.
1	9. The system of claim 7, wherein the brownout detection circuit comprises:
2	a detection circuit that receives the RTC clock signal and determines whether the
3	RTC clock is losing cycles, wherein the detection circuit is calibrated to determine whether a

loss of cycles is above the predetermined threshold; and

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5	a status circuit that stores a signal output by the detection circuit and outputs a status
6	signal indicating the RTC clock is one of GOOD and NOT GOOD.
1	10. The system of claim 9, wherein the detection circuit comprises a resistor-
2	capacitor (RC) time constant component with a predetermined time constant, wherein the RC
3	time constant component receives the RTC clock signal and outputs a decayed voltage,
4	wherein a level of the decayed voltage indicates whether the loss of cycles is above the
5 .	predetermined threshold.
1	11. The system of claim 7, wherein the interface comprises a serial peripheral
2	interface.
1	12. The system of claim 8, wherein the navigation processor sends a command via
2	the interface to the brownout detection circuit requesting a status of the RTC, and wherein
3	the brownout detection circuit responds by sending an RTC status via the interface.
1	13. A system for global positioning system (GPS) navigation comprising:
2	a radio frequency (RF) chip, wherein the RF chip comprises a GPS clock that is
3	calibrated to GPS time when the GPS receiver system is navigating using GPS satellite data,
4	wherein the GPS clock is configured to be turned off when the GPS receiver system is not
5	navigating; and
6	a baseband chip, wherein the baseband chip and the RF chip are coupled through a
7	system interface, and wherein the baseband chip comprises,
8	a real time clock (RTC) that uses significantly less power than the GPS clock,

wherein the RTC is configured to keep time when the GPS clock is turned off; and

10	a brownout detection circuit coupled to the RTC, wherein the brownout
11	detection circuit is configured to detect a loss of RTC clock cycles.
1	14. The system of claim 13, wherein the baseband chip further comprises:
2	a temperature sensor coupled to the RTC; and
3	an analog to digital (A/D) converter coupled to the temperature sensor.
.1	15. The system of claim 14, wherein the baseband chip further comprises an edge
2	aligned ratio counter (EARC) coupled to receive a GPS clock signal and the RTC clock
3	signal and configured to align the respective clock signals with a high degree of accuracy,
4	and to transfer time kept by the RTC clock to the GPS clock.
1	16. The system of claim 15, wherein the baseband chip is coupled to a processor
2	and a memory through a peripheral interface, wherein:
3	the memory device is coupled to the A/D/ converter and to the RTC, and is
4	configured to store a table relating temperature to frequency for the RTC clock; and
5	the processor is configured to receive signals through the peripheral interface,
6	including an RTC status signal that indicates whether the RTC clock signal should be used
7	for satellite acquisition.
1	17. The system of claim 13, wherein the brownout detection circuit comprises:
2	a detection circuit that receives the RTC clock signal and determines whether the
3	RTC clock is losing cycles, wherein the detection circuit is calibrated to determine whether a
4	loss of cycles is above the predetermined threshold: and

predetermined threshold; and

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5	a status circuit that stores a signal output by the detection circuit and outputs a status
6	signal indicating the RTC clock is one of GOOD and NOT GOOD.
1	18. The system of claim 17, wherein the detection circuit comprises a resistor-
2	capacitor (RC) time constant component with a predetermined time constant, wherein the RC
3	time constant component receives the RTC clock signal and outputs a decayed voltage,
4	wherein a level of the decayed voltage indicates whether the loss of cycles is above the
5	predetermined threshold.
1	19. The system of claim 13, wherein the system interface comprises a serial
2	peripheral interface.
1	20. The system of claim 16, wherein the processor sends a command via the
2	peripheral interface to the brownout detection circuit requesting a status of the RTC, and
3	wherein the brownout detection circuit responds by sending an RTC status signal via the
4	peripheral interface.
1	21. An apparatus for detecting a loss of clock cycles in a clock signal generating
2	device, the apparatus comprising:
3	a detection circuit that receives the a clock signal from the clock signal generating
4	device, and determines whether the clock signal generating device is losing cycles, wherein
5	the detection circuit is calibrated to determine whether a loss of cycles is above the

a status circuit that stores a signal output by the detection circuit and outputs a status signal indicating the clock signal generating device is one of GOOD and NOT GOOD.

1	22. The apparatus of claim 21, wherein the detection circuit comprises a resistor-
2	capacitor (RC) time constant component with a predetermined time constant, wherein the RC
3	time constant component receives the clock signal and outputs a decayed voltage, wherein a
4	level of the decayed voltage indicates whether the loss of cycles is above the predetermined
5 .	threshold.
1	23. The apparatus of claim 22, wherein:
2	the status circuit comprises a latch device; and
3	the detection circuit further comprises a voltage comparator coupled to latch device,
4	wherein the voltage comparator compares the decayed voltage and a reference voltage and
5	outputs a result signal that resets the latch when the loss of cycles is above the predetermined
6	threshold.
1	24. A method of determining a status of a real time clock (RTC) in a global
2	positioning system (GPS) receiver, the method comprising:
3	receiving an RTC clock signal in a detection circuit;
4.	detecting when the RTC is losing clock signals such that the loss of clock cycles is
5	above a predetermined threshold;
6	storing the status of the RTC, wherein the status is one of GOOD and NOT GOOD;
7	if the loss of clock cycles is above the predetermined threshold, setting the status of
8	the RTC to bad; and
9	before using the RTC clock signal for acquiring satellites, checking the status of the
· ·	DTC.

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1	25. The method of claim 24, wherein detecting comprises receiving the RTC
2	clock signal in a resistor-capacitor (RC) circuit with a calculated RC time constant such that
3	when the loss of clock cycles is above the predetermined threshold, an output voltage of the
4	RC circuit decays below a predetermined level.
1	26. The method of claim 25, wherein storing the status comprises storing a status
2	bit based on the output voltage level of the RC circuit, wherein a first logic value of the statu
3	bit indicates GOOD and a second logic value of the status bit indicates "bad.
1	27. The method of claim 26, further comprising, on start-up of the GPS receiver,
2	setting the status bit to indicate GOOD during an interval when the RTC is powering up.
1	28. The method of claim 27, further comprising:
2	on start-up of the GPS receiver, transferring time kept by the RTC to a GPS clock
3	using an edge aligned ratio counter (EARC);
4	checking the status of the RTC; and

if the status of the RTC is GOOD, using the transferred time to acquire satellites.